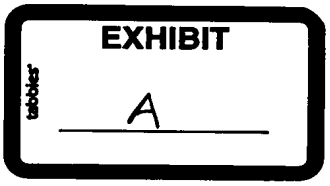

(11) Japanese Unexamined Patent Application Publication No. 7-89053

(43) Publication Date: April 4, 1995

(21) Application No. 5-234455

(22) Application Date: September 21, 1993

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(54) [Title of the Invention] PRINTING PLATE PREPARING APPARATUS

(57) [Abstract]

[Object] The ink amount data for each ink duct of the printing machine is simultaneously calculated by the use of image data used for exposure of a printing plate preparing apparatus.

[Solving Means] A printing plate preparing apparatus 100 has an exposure unit 10 which directly exposes the surface of a plate material 13 on the basis of bitmap data 6 to generate a printing plate; a printing area calculating unit 50 which sets a test area by virtually dividing the surface of the plate material 13, integrates the number of exposure data in the printing area from the bitmap data 6, and calculates exposure data for each test area; and an area

ratio operating unit 60 for determining an area ratio of the printing area for each test area on the basis of the integrated exposure data as ink amount data.

[Claims]

[Claim 1] A printing plate preparing apparatus which copes with the entire printing surface of a plate material, prepares a printing plate by directly exposing the surface of said plate material by use of bitmap data for an area including a pattern portion and a line drawing portion, and simultaneously calculates ink amount data necessary in the printing process, comprising:

test area setting means which sets test areas by dividing the printing surface of said plate material;

data integrating means which integrates the number of exposure data or the number of non-exposure data from among said bitmap data corresponding to said test areas; and

ink amount data calculating means which calculates ink amount data on the basis of integrated data for each of said test areas.

[Claim 2] The printing plate preparing apparatus according to claim 1, wherein said test area setting means sets test areas so that a test area has a rectangular shape having a side having a length corresponding to an area to which the ink is supplied from an ink duct of the printing machine used in the printing process.

[Detailed Description of the Invention]

[0001]

[Technical Field] The present invention relates to a

printing plate preparing apparatus used in the plate preparing process. More particularly, the invention relates to a printing plate preparing apparatus capable of, simultaneously with preparation of a printing plate, calculating ink amount data used in the printing process.

[0002]

[Background Art] A printed matter is produced by setting a printing plate prepared by a plate-making process, feeding ink to the printing surface thereof, and transferring images onto paper or the like. Fig. 9 schematically illustrates the relationship between the printing plate and the ink feeder of the printing machine in the printing process. The printing machine has a plurality of ink ducts arranged at prescribed intervals in the width direction (the transverse direction in Fig. 9) of the printing plate 1. The ink fed from the ink ducts 300 is supplied to the surface of the printing plate 1 via various rollers. The amount of ink is adjusted for each of the ink ducts 300 by adjusting the opening of the ink ducts 300. Ink fed from an ink duct 300 is supplied to ink zones formed by dividing virtually the surface of the printing plate 1 in correspondence to the individual ink ducts 300.

[0003] As the printing surfaces corresponding to the ink zones 7 comprise a mixture of printing areas and non-printing areas or high-image-density areas and low-image-

density areas, it is desirable to adjust the amount of ink to be fed for each ink zone 7. For this purpose, it is a common conventional practice to measure the printing surface of the prepared printing plate 1 by a special reader, thereby determining an amount of ink for each ink zone 7 from the area of the image portions of the printing plate 1, and adjust the opening of the ink ducts 300 in response to this ink amount data (JP No. 59-71863).

[0004]

{Problems to be Solved by the Invention] However, the method of directly reading out image areas from the prepared printing plate to determine ink amount data requires a special reader and an ink amount data calculating operation, and the processing was troublesome for the operator. On the other hand, Japanese Examined Patent Application No. 4-12227 discloses a method, in a plate-making process of a photographic original, upon color-separating the photographic original to prepare a screen dot film for each color plate, of calculating ink amount data used for adjustment of the ink ducts of the printing machine by the use of color-separated image (pattern) data. In this method, however, ink amount data is calculated for each of small section areas set by dividing the printing area 9 for each page into more sections as shown in Fig. 9. For a printing plate 1 having a plurality of page areas 9 arranged therein,

therefore, it was necessary to refer to ink amount data calculated by this method for each of the page areas, and the operator had to calculate ink amount data for each ink zone 7 of the printing plate 1. In the publication of Japanese Examined Patent Application No. 4-12227, line drawing data such as characters and graphics are not contained in the subjects of processing. For a printing plate containing line drawing data, therefore, the operator had to calculate by synthesizing ink amount data for the individual ink ducts through calculation of ink amounts.

[0005] The present invention was therefore developed to solve the above-mentioned problems, and has an object to provide a printing plate preparing apparatus which permits calculation of ink amount data for each of the ink ducts installed for the printing plate by use of image data in the plate-making process.

[0006]

[Means for Solving the Problems] The present invention provides, as recited in claim 1, a printing plate preparing apparatus which copes with the entire printing surface of a plate material, prepares a printing plate by directly exposing the surface of the plate material by use of bitmap data for an area including a pattern portion and a line drawing portion, and simultaneously calculates ink amount data necessary in the printing process, comprising test area

setting means which sets test areas by dividing the printing surface of the plate material; data integrating means which integrates the number of exposure data or the number of non-exposure data from among the bitmap data corresponding to the test areas; and ink amount data calculating means which calculates ink amount data on the basis of integrated data for each of the test areas.

[0007] In the printing plate preparing apparatus of claim 2 of the present invention, the test area setting means sets test areas so that a test area has a rectangular shape having a side having a length corresponding to an area to which the ink is supplied from an ink duct of the printing machine used in the printing process.

[0008]

[Operation] The printing plate preparing apparatus of the present invention copes with the entire printing surface of a plate material and receives bitmap data of an area including pattern portions and image portions as an input. The printing plate is prepared by directly exposing the surface of the plate material. By the simultaneous use of the bitmap data, ink amount data necessary for the subsequent printing process is calculated. For this purpose, the test area setting means first sets test areas by dividing the printing surface of the plate material. The data integrating means integrates any of the number of

exposure data or the number of non-exposure data from among the bitmap data corresponding to the test areas, and calculates integrated data for each test area. The ink amount calculating means calculates ink amount data on the basis of integrated data for each test area.

[0009] In the printing plate preparing apparatus of claim 2 of the present invention, the test area setting means sets test areas so as to form rectangular area each having a side having a length equal to the length of supply of ink from an ink duct of the printing machine used in the printing process.

[0010]

[Embodiments] Embodiments of the present invention will now be described in detail with reference to the drawings. Fig. 1 is a block diagram illustrating the configuration of the printing plate preparing apparatus of an embodiment of the present invention; and Fig. 2 is a block diagram schematically illustrating the entire configuration of a plate-making system including this printing plate preparing apparatus. This plate-making system comprises an image processing system 200 and a printing plate preparing apparatus 100 online- or offline-connected thereto.

[0011] To begin with, an outline of the configuration and processing of the image processing system 200 will be described. Referring to Fig. 2, the image processing system

200 has an image input scanner 210, a line drawing processor 220, operation input units 230 such as a keyboard and a graphic display, a storage unit 240 storing image data, an editing unit 250, and an RIP (a raster image processor) 260.

[0012] Fig. 3 illustrates the flow of processing at the individual units of the plate-making system along transition of data. An outline of processing by the image processing system 200 will not be described with reference to Figs, 2 and 3. The image input scanner 210 reads a photographic original 2 and carries out color processing to prepare pattern for the individual colors (Y, M, C and K) in units of original. The line drawing processor 220 is composed of a computer photocomposing machine, a digitizer and the like, and prepares line drawing data 4 by entering characters and graphics.

[0013] The editing unit 250 receives pattern data 3 from the image input scanner 210 and receives line drawing data 4 from the line drawing processor 220. Upon receipt of an instruction from the operator such as layout information from the operation input unit 230, it edits pattern data 3 and line drawing data 4 in accordance with an instruction thereof to prepare image data in units of page. Upon the completion of edition in units of page, a plurality of pages are arranged on a printing surface in accordance with a binding specifications and the like, thereby preparing page

arrangement data 5. The page arrangement data 5 is prepared with characters and graphics vector data for the line drawing areas, and with image density data for the pattern areas.

[0014] The RIP 260 receives page arrangement data 5 from the editing unit 250 and conducts screening for the pattern areas. It conducts vector development for the line drawing areas, thus preparing bitmap data 6 corresponding to the color-separated printing plates. The bitmap data 6 is composed of binary data including a "1" representing an image portion and a "0" representing a non-image portion for each of dots formed by dividing the entire printing surface in accordance with the exposure resolution of the printing plate preparing apparatus 100 described later.

[0015] As described above, the image processing system 200 prepares bitmap data 6 for each printing plate having a plurality of pages arranged thereon including pattern areas and line drawing areas and outputs it. The printing plate preparing apparatus 100 will now be described. As shown in Fig. 1, the printing plate preparing apparatus 100 has an exposing unit 10 which directly exposes a plate material 13 to prepare a printing plate; a scanning control unit 30 which controls exposure scanning of the exposing unit 10; an image control unit 40 which receives bitmap data 6 from the RIP 260 and controls the output of the exposing head 15; an

image area calculating unit 50 which calculates the area of the image portion on the basis of the bitmap data from the RIP 260; an area ratio operating unit 60 which calculates an area ratio of the image area (ink amount data) for each divided are (test area) from data of the image area calculated by the image area calculating unit 50; a CPU 70 which controls operation of the individual processors; a memory 80; an operating input unit 90; and a data output unit 95.

[0016] The exposing unit 10 further comprises a drum 11 onto which a plate material 13 prepared by covering the surface of the plate raw material such as aluminum is wound and which is rotated by a main scanning motor 12; a rotary encoder 14 which detects an amount of rotation and speed of the drum 11; an exposing head 15 which directly exposes the surface of the plate material 13 by irradiating an exposing beam onto the surface of the plate material 13 in response to the exposure data; a feed screw 16 which causes displacement of the exposing head 15 in the sub-scanning direction Y; and a sub-scanning motor 17 for rotating the feed screw 16.

[0017] The scanning control unit 30 controls exposing operation of the plate material 13 in the main scanning direction X on the drum 11 by controlling rotating operation of the main scanning motor 12, and controls displacement of

the exposing head 15 in the sub-scanning direction Y by controlling rotating operation of the sub-scanning motor 17. The image area calculating unit 50 further comprises a first counter 51, a second counter 52, a third counter 53, a register 54, a comparator 55 and a latch 56. Operation of these components will be described later. Operation of the printing plate preparing apparatus 100 of this embodiment will now be described. This printing plate preparing apparatus 100 simultaneously has a printing plate preparing function of directly preparing a printing plate by exposing the surface of the plate material 13 and an ink amount calculating function of calculating ink amount data. The ink amount calculating processing is carried out simultaneously with the printing plate preparing processing by the use of the bitmap data used for the printing plate preparing processing. Therefore, the operation of the printing plate preparing processing will first be described, and then the ink amount calculating process will be described.

(Printing plate preparing processing)

(1) Referring to Fig. 1, when start of exposure is instructed by the operator, the scanning control unit 30 outputs a drum driving pulse P1 to the main scanning motor 12 to start rotation of the drum 11. Simultaneously with this, it generates a reference timing signal LS (see Fig. 6)

of exposure in the main scanning direction X, and outputs it to the RIP 26. This reference timing signal LS is generated once every rotation of the drum 11.

(2) The image control unit 40 reads out bitmap data 6 for each line from the RIP 260 in synchronization with the reference timing signal LS. It generates also a clock signal DC (see Fig. 7) for matching with the output timing of the exposure data, converts the bitmap data 6 into output data of the exposing head 15 in units of bit in synchronization with the timing of this clock signal DC, and outputs it to the exposing head 15. For example, in the case of a "1" representing an image portion by the bitmap data 6, it generates exposure data output "ON" of the exposing head 15. In the case of a "0" representing a non-image portion by the bitmap data 6, it generates non-exposure data output "OFF" and outputs it. In response to this output data, the exposing head 15 irradiates an exposing beam onto the surface of the plate material 13 to cause an exposing processing for each line in the main scanning direction X.

(3) The scanning control unit 30 receives an amount of rotation of the drum 11 as detected by the rotary encoder 14 to monitor whether or not scanning of one line (a turn of the drum 11) in the main scanning direction has been completed. Upon detection of the completion of scanning for

one line, it outputs a driving pulse P2 to the sub-scanning motor 17 and turns the feed screw 16 to cause the exposing head 15 in the sub-scanning direction Y by one dot. The scanning control unit 30 generates again a reference timing signal LS and reads out the bitmap data 6 for the next one line from the RIP 260 into the image control unit 40 to carry out an exposing processing similar to the above.

(4) The printing plate 1 is prepared by carrying out the above-mentioned processing over the entire exposure area of the plate material 13 (all lines).

(Ink amount data calculating processing) First, setting of divided areas (test areas) for determining ink amount data will be described. Fig. 4 schematically represents the relationship between the scanning direction of the exposing beam of the printing plate preparing apparatus 100 to the plate material 13 (main scanning direction size XL: sub-scanning direction YL) and the printing direction in the printing machine. The main scanning direction X of exposure to the plate material 13 and the printing direction P in the printing machine do not always agree with each other, depending upon the type of the printing machine. For example, Fig. 4(a) represents a case where the main scanning direction X in the printing plate preparing apparatus 100 id different from the printing direction P in the printing machine, and Fig. 4(b) shows a case where the main scanning

direction X agrees with the printing direction P.

[0018] When these directions are different from each other, as shown in the bottom-stage drawing in Fig. 4(a), the size x1 in the main scanning direction of the divided area 8 is set by dividing the main scanning direction size XL of the plate material 13 by a dividing number entered by the operator. This dividing number is the number of ink zones 7 regulated by the arrangement of the ink ducts 300. The divided area 8 forms a strip-shaped rectangle long in the sub-scanning direction Y. This setting method is hereinafter referred to as the main scanning direction dividing method.

[0019] When these directions are in agreement, as shown in the bottom-stage drawing of Fig. 4(b), the size y2 in the sub-scanning direction of the divided areas 8 is set by dividing the sub-scanning direction size YL of the plate material 13 by a dividing number entered by the operator. This dividing number is the number of ink zones 7 as in the above-mentioned case. The divided area 8 in this case forms a strip-shaped rectangle long in the main scanning direction X. This setting method is hereinafter referred to as the sub-scanning direction dividing method.

[0020] Figs. 5 and 6 are flowcharts illustrating the ink amount data calculating processing, and Fig. 7 illustrates timing charts of individual signals used in the ink amount

data calculating processing. The following description will be made with reference to Figs. 5, 6 and 7. In Fig. 5, the operator enters a dividing direction (the main scanning direction X or the sub-scanning direction Y) for setting a divided area 8 which is the object of calculation of ink amount data and a dividing number (n, n=4 in Fig. 4) into the operation input unit 9 (step S10).

[0021] If the entered dividing direction is the main scanning direction X, the main scanning direction dividing method is determined to be used, and the process advances to step S20. If the sub-scanning direction Y is entered, the sub-scanning direction dividing method is assumed to be used, and the process goes to the processing in step S30 (Fig. 6) (step S11).

(Main scanning direction dividing method) If the main scanning direction X is entered as the dividing direction, a divided number of dots obtained by dividing the total number of dots in the main scanning direction of the late material 13 by the entered dividing number n (TD/n) is stored in the register 54 as the main scanning direction size x1 in step S20. In step S21, the sub-scanning direction size YL of the plate material 13 and the total number of lines TL dependent on the exposure resolution are recognized in the CPU 70 and registered.

[0022] In step S22, the memory 80 is cleared. Then, when

the operator gives an instruction of exposing processing from the operator input unit 90, the exposing processing is started (step S23). The scanning control unit 30 generates a reference timing signal LS which regulates the timing for starting exposure in the main scanning direction X, and outputs it to the RIP 260 and the image area calculating unit 50. The RIP 260 outputs bitmap data 6 for each line in synchronization with the reference timing signal LS to the image control unit 40. The bitmap data 6 is set to "1" for an image portion and "0" for the non-image portion. The image control unit 40 generates a clock signal DC which regulates the output timing of exposure or non-exposure, sequentially converts the bitmap data 6 into output data for exposure in synchronization with the clock signal DC, and outputs the converted data to the exposing head 15.

[0023] Simultaneously at this moment, an exposure data detecting signal DD is generated when the bitmap data 6 is "1". As shown in Fig. 7, the first counter 51 counts the number of clocks DCN of the entered clock signal DC and the second counter 52 counts the number of times of generation of the exposure data detecting signal DD (number of exposure data Di,j) with the reference timing signal LS as a timing of count start (step S24). In the exposure data Di,j, I means the ordinal number of the divided area, and j, the ordinal number of line.

[0024] The comparator 55 compares a count value DCN of the clock signals DC read out from the first counter 51 and the number of dots stored in advance in the register (TD/n) (step S25). When the count value DCN of the first counter 51 is smaller than the number of divided dots (TD/n), the processing in step S24 is continued. When both numbers are the same, the comparator 55 issues a count end notice signal ES, whereby the number of exposure data Di,j counted by the second counter 52 is stored in the latch 56, and at the same time, the first counter 51 and the second counter 52 are cleared (step S26). At this point in time, the count end notice signal ES is given also to the CPU 70. The first and second counters 51 and 52 may be cleared also by a reference timing signal LS for each line.

[0025] Upon receipt of the count end notice signal ES, the CPU 70 reads in the values stored in the latch 56. The CPU 70 reads out the already calculated data already stored, from the storage area of the memory 80 corresponding to the divided area 8 for which the number of exposure data Di,j stored newly in the latch 56 has been calculated, makes an addition of the exposure data Di,j stored in the latch 56 and the already calculated data read out from the memory 80, and stores the result into the corresponding storage area of the memory 80 again (step S27).

[0026] The third counter 53 counts the number LN of the

reference timing signals LS occurring for each line of the main scanning. That is, the ordinal number of line for which the exposing processing is currently executed in the main scanning direction is counted, and the CPU 70 monitors this. Upon processing in the above-mentioned step S27, if the third counter 53 does not count the next reference timing signals LS, the CPU 70 determines that the processing of the first line thereof has not as yet been completed (step S28), repeats execution of the above-mentioned steps S24 through s27, and stores the obtained data into the memory 80.

[0027] An example of the storage area of the memory 80 is illustrated in Fig. 8(a). For example, when the exposing processing in the main scanning direction X is performed for the second line of the first divided area 81 (see Fig. 4(a)), the number of exposure data D1,2 of the second line is stored in the latch 56. At this moment, the exposure data D1,1 of the first line of the same divided area 81 has already been stored in the corresponding storage area m1 of the memory 80. The CPU 70 makes an addition of data D1,2 read out from the latch 56 and data D1,1 read out from the storage area m1 of the memory 80, and stores the data after the addition in the same storage area m1 of the memory 80 (step S27).

[0028] Upon the completion of the above-mentioned

processing of that one line of step S28, it is determined whether or not processing of all the lines has been completed. This determination is executed through comparison by the CPU 70 of the total number of lines TN registered in step S21 and the count value LN of the third counter 53. More specifically, when LN<TL, it is determined that processing of all the lines has not as yet been completed and the above-mentioned steps S24 through S28 are repeated. If LN=TL, calculation (described later) of the area ratio of the image portion (ink amount data) is started.

[0029] (Sub-scanning direction dividing method) When the dividing direction entered in step S10 is determined to be the sub-scanning direction Y (step S11), the total number of dots TD in the main scanning direction X is stored in the register 54. In step S31, the CPU 70 recognizes the number of divided lines obtained by dividing the total number of lines TL by the entered dividing number n as the sub-scanning direction size y2 of the divided area 8, and registers it. In step s32, the memory 80 is cleared.

[0030] When the operator gives an exposing instruction from the operation input unit 90, the exposing processing is started (step S33), and as in the above-mentioned step S24, in step S34, the first counter 51 counts the number of clocks CCN of the entered clock signals DC with the reference timing signal LS as the count starting timing.

The second counter 52 counts the number of occurrences of the exposure data detection signal DD (exposure data Di, j) having bitmap data of "1" (step S34).

[0031] The comparator 55 compares the count value DCN read out from the first counter 51 and the total number of dots TD stored in advance in the register 54 (step S35). When the count value DCN of the first counter 51 is smaller than the total number of dots TD, the processing is continued. When these values are the same, the comparator 55 issues a count end notice signal ES, whereby the exposure data Di,j counted by the second counter 52 is stored in the latch 56 and the first counter 51 and the second counter 52 are cleared (step S36). In this case, the count end notice signal ES is given to the CPU 70. The counter end notice signal ES in this case means also the end of a line.

[0032] Upon receipt of the count end notice ES, the CPU 70 reads in the exposure data Di,j newly stored in the latch 56. The CPU reads out already calculated data stored previously from the storage area of the memory 80 corresponding to the divided area 8 for which the exposure data to be stored in the latch 56 has been calculated. The CPU 70 makes an addition of the newly calculated exposure data Di,j stored in the latch 56 and the already calculated data read out from the memory 80, and stores the result in the corresponding storage area of the memory 80 (step S37).

[0033] A typical storage area of the memory 80 is illustrated in Fig. 8(b). For example, when an exposing processing in the main scanning direction X is carried out for the second line of the first divided area 81 (see fig. 4(b)), the number of exposure data D1,2 of that second line is stored in the latch 56. At this moment, the number of exposure data D1,1 for the first line of the same divided area 81 is already stored in the corresponding storage area m1 of the memory 80. The CPU 70 makes an addition of the data D1,2 read out from the latch 56 and the data D1,1 read out from the storage area m1 of the memory 80, and stores the data after addition in the same storage area m1 of the memory 80 (step S37).

[0034] The CPU 70 compares the count number LN of the third counter 53 and the number of divided lines (TL/n), and determines whether or not processing of each divided area 8, i.e., the number of divided lines (TL/n) has been completed (step S38). Then, the CPU 70 compares the count value LN of the third counter 53 and the total number of lines TL to determine whether or not processing of all the line has been completed (step S39).

[0035] Upon the completion of data calculation for the entire plate material 13 (step s29, S39), the area ratio operating unit 60 reads out count values (exposure data) of the image portions determined for each of the divided areas

81 to 84 from the storage areas m1 to m4 of the memory 80. It then calculates area ratios of the image portions or the area ratios of the non-image portions by the use of the following formula (step S40).

[0036]

[Image portion area ratio] = [unit pixel area] s [image portion count value] / [divided area size]

[Non-image portion area ratio] = 1 - [image portion area ratio]

The unit pixel area represents the area for one dot regulated by the resolution of the exposing unit 10. The calculated image portion area ratio data is outputted from the data output unit 95 as ink amount data (step S41).

[0037] This area ratio data is stored in the storage medium of the data output unit 95 and passed online or offline to the printing machine. The printing machine sets an opening of the ink feed port of the ink duct corresponding to the area ratio data for each divided area set virtually on the printing surface of the printing plate. This permits achievement of a more appropriate ink feed amount by reducing the ink feed amount for a printing area having a smaller image area and increasing the ink feed amount for a printing area having a larger image area.

[0038] In the above-mentioned embodiment, the configuration has been such that the image area calculating unit 50 counts

the number of exposure data having a bitmap data value of "1" corresponding to the image portions. However, the configuration may be such that the unit 50 counts the number of non-exposure data of a non-image portion value of "0". The above-mentioned embodiment has covered a case where a cylindrical outer surface scanning type structure of the exposing unit 10 is used. The present invention is not however limited to such a case, but a cylindrical inner surface scanning type or a flat scanning type structure may be applied.

[0039]

[Advantages] As described above, the printing plate preparing apparatus of the present invention has a configuration such that it receives bitmap data including pattern portions and line drawing portions and the surface of the plate material is directly exposed by the use thereof to prepare a printing plate. Ink amount data for a printed area or a non-printed area is calculated on the basis of the bitmap data for each test area set by dividing the surface of the plate material. It is therefore possible to eliminate troubles of carrying out ink amount data calculation after preparation of a printing plate and thus to improve operating efficiency of the plate-making and printing processes.

[Brief Description of the Drawings]

[Fig. 1] Fig. 1 is a block diagram illustrating the configuration of the printing plate preparing apparatus of an embodiment of the present invention.

[Fig. 2] Fig. 2 is a block diagram schematically illustrating the configuration of the plate-making system including the printing plate preparing apparatus of the present invention.

[Fig. 3] Fig. 3 is a descriptive view conceptually illustrating the transition of data in the plate-making system shown in Fig. 2.

[Fig. 4] Fig. 4 is a descriptive view illustrating the setting method of a divided area.

[Fig. 5] Fig. 5 is a flowchart illustrating the operation of ink amount data calculating processing of the printing plate preparing apparatus shown in Fig. 1.

[Fig. 6] Fig. 6 is a flowchart illustrating the operation of ink amount data calculating processing of the printing plate preparing apparatus shown in Fig. 1.

[Fig. 7] Fig. 7 is a timing chart illustrating timing of various signals in the ink amount data calculating processing of the printing plate preparing apparatus shown in Fig. 1.

[Fig. 8] Fig. 8 is a descriptive view illustrating a storage area of the memory in the printing plate preparing apparatus shown in Fig. 1.

[Fig. 9] Fig. 9 is a conceptual view conceptually illustrating the arrangement relationship between the printing plate and the ink ducts in the printing process in a conventional printing machine.

[Reference Numerals]

1: Printing plate

8, 81, 82, 83, 84: Divided area (test area)

10: Exposing unit

13: Plate material

30: Scanning control unit

40: Image control unit

50: Image area calculating unit

60: Area ratio operating unit

70: CPU

80: Memory

100: Printing plate preparing apparatus

FIG. 1

30: SCANNING CONTROL UNIT

40: IMAGE CONTROL UNIT

90: OPERATION INPUT UNIT

95: DATA OUTPUT UNIT

60: AREA RATIO OPERATING UNIT

80: MEMORY

53: THIRD COUNTER

52: SECOND COUNTER

51: FIRST COUNTER

55: COMPARATOR

56: LATCH

54: REGISTER

50: IMAGE AREA CALCULATING UNIT

FIG. 2

220: LINE DRAWING PROCESSOR

250: EDITING UNIT

100: PRINTING PLATE PREPARING APPARATUS

FIG. 3

210: IMAGE INPUT SCANNER

3: PATTERN DATA (IN UNITS OF ORIGINAL)

220: LINE DRAWING PROCESSOR

4: LINE DRAWING DATA (CHARACTERS, GRAPHICS)

250: EDITING UNIT

5: PAGE ARRANGEMENT DATA

· CHARACTERS, GRAPHICS

· VECTOR DATA

· IMAGE DENSITY DATA

6: BITMAP DATA

100: PRINTING PLATE PREPARING APPARATUS

INK AMOUNT DATA

FIG. 4

① SIB-SCANNING DIRECTION

② PRINTING DIRECTION

③ MAIN SCANNING DIRECTION X

④ PRINTING DIRECTION P

⑤ SUB-SCANNING DIRECTION

⑥ MAIN SCANNING DIRECTION

⑦ PRINTING DIRECTION P

FIG. 5

START

S10: INPUT DIVIDING DIRECTION X OR Y, AND DIVIDING NUMBER n

S11: DIVIDING DIRECTION = X?

S20: STORE NUMBER OF DIVIDED DOTS TD/n IN REGISTER 54

S21: REGISTER TOTAL NUMBER OF LINES TL

S22: CLEAR MEMORY 80

S23: START EXPOSING

S24: COUNT NUMBER OF CLOCKS DCN

COUNT NUMBER OF EXPOSURE DATA Di,j

S26: STORE NUMBER OF EXPOSURE DATA Di,j IN LATCH

CLEAR COUNTERS 51 AND 52

S27: ADD NEWLY CALCULATED EXPOSURE DATA Di,j TO ALREADY CALCULATED NUMBER OF EXPOSURE DATA, AND STORE RESULT IN MEMORY 80

S28: IS ONE LINE COMPLETED?

S29: HAVE ALL LINES BEEN COMPLETED?

FIG. 6

S30: STORE TOTAL NUMBER OF DOTS TD IN REGISTER 54

S31: REGISTER NUMBER OF DIVIDED LINES (TD/n)

S32: CLEAR MEMORY 80

S33: START EXPOSING

S34: COUNT NUMBER OF CLOCKS DCN

COUNT NUMBER OF EXPOSURE DATA Di,j

S36: STORE EXPOSURE DATA Di,j IN LATCH

CLEAR COUNTERS 51 AND 52

S37: ADD NEWLY CALCULATED EXPOSURE DATA Di,j TO ALREADY CALCULATED EXPOSURE DATA, AND STORE RESULT IN MEMORY 80

S38: HAVE ALL DIVIDED LINES (TD/n) BEEN COMPLETED?

S39: HAVE ALL LINES BEEN COMPLETED?

S40: CALCULATE AREA RATIO OF IMAGE PORTIONS (INK AMOUNT DATA)

S41: OUTPUT RESULT OF CALCULATION

END

FIG. 7

COUNTER 51

COUNTER 52

COMPARATOR 55 (ES)

MAIN SCANNING DIRECTION X

SUB-SCANNING DIRECTION Y

IMAGE PORTION (EXPOSURE)

FIG. 9

PRINTING DIRECTION